

Prevalence of Overweight and Obesity among the Meitei Adolescent of Manipur, India

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KEYWORDS BMI. Height. Imphal. Lifestyle. Weight

ABSTRACT The obesity has become a global epidemic. Therefore, the prevalence of overweight and obesity among the Meitei adolescent in Manipur has been studied. A cross-sectional study of 540 subjects was done during November 2009 to August 2010 in the urban area of Imphal, Manipur. Data on height and body weight were collected. Body mass index (BMI) for each subject was calculated. Prevalence of overweight and obesity are evaluated using both the Asian cut-off point and WHO International standard. Overweight (5.46%) and obesity (1.17%) among boys and overweight (6.69%) and obesity (0.36%) among girls are reported when assessment is done by using Asian cut-off point. When the BMI was assessed according to the WHO standard, 3.12 percent of boys and 3.87 percent girls are found to be overweight. The present study shows an increase in the prevalence of overweight and obesity among the Meitei adolescent. The possible reason could be changes in dietary intake and an increasingly sedentary lifestyle.

INTRODUCTION

The problem of obesity develops from chronic quantitative imbalance between the energy intake and energy expenditure leading to excessive accumulation of adipose tissue within the body (Bray and Bellanger 2006). Obesity has become known as an epidemic worldwide (Kaur et al. 2008). About one in ten of the world's adult population was obese and 43 million children under age five were overweight (WHO 2011). WHO (2002) has declared overweight as one of the top 10 health risks in the world, while it is ranked in the top five of those in developed countries. In developing countries, with India being one of them, proportion of overweight and obese people now co-exist with those who are under nourished (Popkin 2002).

Over the past two decades, the prevalence of overweight and obesity has increased in both developed and developing countries (Doll et al. 2002). For example, the prevalence of obese school children was 20 percent in UK, 15.8 percent in Saudi Arabia, 15.6 percent in Thailand, 10

percent in Japan and 7.8 percent in Iran (Mo-Suwan et al. 1993; Al-Nuaim et al. 1996). In England, obesity in children and adolescent of all ethnicities has increased nearly two times over the past 10 years (Matijasevich et al. 2009). Within India, studies from Delhi and Chennai have shown that the prevalence of obesity was about 7 percent and 6 percent respectively (Kapil et al. 2002; Subramanyam et al. 2003). Recent data on south Indian school children showed that overweight percent has increased from 4.3 percent in 2003 to 6.5 percent in 2005 (Raj et al. 2007). This increasing tendency of overweight and obesity is now causing concern in societies and among the health care providers. Less study have been done on the prevalence of overweight and obesity among the Meitei adolescent, hence the present study was conducted in Manipur.

Objective

The primary purpose of the study is to determine the prevalence of overweight and obesity among the adolescent Meitei of Manipur.

MATERIALS AND METHODS

A cross-sectional study was done on 540 adolescents (256 boys and 284 girls) aged 14-19 years. Data collection was carried out during November 2009 to August 2010 in the urban area

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of Imphal, the capital of Manipur. The study subjects were collected randomly from Meitei children following a house to house visit. An anthropometer rod and a weighing scale to the nearest of 0.1 cm and 0.5 kg respectively was used to measure height and weight (Lohman et al. 1988). The parameters taken have been analyzed statistically to find out the mean, standard deviation and standard error of mean. In order to test the level of significance, both t-test and chi-square test have been used. The value of $p < 0.05$ and $p < 0.01$ are considered statistically significant. Presence of overweight and obesity have been evaluated using both WHO standard value (overweight- $\text{BMI} \geq 25$; obese- $\text{BMI} \geq 30$) and Asian cut-off points (overweight- $\text{BMI} \geq 23$; obese- $\text{BMI} \geq 27$), as is recommended by the World Health Organization (WHO 2000). MS-Excel software has been used for all statistical analyses of the present research.

RESULTS

The age wise mean, standard deviation, standard error of mean and t value with the level of significance between the different age groups for both the sexes are given in Tables 1 and 2. In general, it can be evaluated that boys are taller and heavier than girls. This conclusion is valid for all ages. Table also shows an increasing trend in height and weight in both boys and girls.

Height and body weight are found significantly increased till 16 years among boys and between 14 and 15 years among girls.

The prevalence of overweight and obesity for both sexes according to Asian cut-off value and WHO International value are given in the Tables 3 and 4 respectively. Table 3 shows that the highest prevalence of overweight (7.5%) and obesity (2.5%) among boys was found in 14 years old boys. Among girls, overweight (8.89%) was found higher in 14 years old girls, whereas obesity (2%) was found higher among 19 years old girls. According to the WHO International value (Table 4), overweight (5%) among the boys was found higher in 14 year old boys, while among the girls, overweight (6%) was found higher in 19 years old girls.

The overall distribution of overweight and obesity for both (14-19 years) boys and girls are given in the Table 5. The Table indicates that 5.46 percent of boys and 6.69 percent of girls were overweight by an assessment of BMI, using conventional Asian cut-off points. When the BMI was assessed according to WHO International standard, 3.12 percent of boys and 3.87 percent of girls were found to be overweight. When the prevalence of obesity was assessed using the Asian cut-off points, it was found that boys (1.17%) are more obese than girls (0.36%). However, the differences are statistically non-significant ($\chi^2 = 1.52$, $df = 1$, $p > 0.05$) between the prevalence of overweight and obesity.

Table 1: Basic data on height and weight of the Meitei adolescent (boys)

Age	N	Height (centimeter)					Weight (kilogram)				
		Mean	$\pm SD$	$\pm SE$	t test	t level	Mean	$\pm SD$	$\pm SE$	t test	t level
14	40	154.56	8.00	1.28			48.2	6.68	1.06		
15	42	158.07	6.78	1.05	2.13	$p < 0.05$	51.64	5.68	0.88	2.47	$p < 0.05$
16	41	162.51	6.63	1.04	3.01	$p < 0.01$	54.18	5.84	0.92	2.01	$p < 0.05$
17	42	162.72	6.74	1.05	0.14	ns	54.12	5.02	0.78	0.05	ns
18	45	163.93	5.65	0.85	0.89	ns	55.76	5.76	0.86	1.42	ns
19	46	165.24	4.38	0.65	1.23	ns	58.32	5.96	0.88	2.08	$p < 0.05$

N= total number of subjects, SD=standard deviation, SE= standard error

Table 2: Basic data on height and weight of the Meitei adolescent (girls)

Age	N	Height (centimeter)					Weight (kilogram)				
		Mean	$\pm SD$	$\pm SE$	t test	t level	Mean	$\pm SD$	$\pm SE$	t test	t level
14	45	147.79	6.10	0.91			45.15	4.88	0.73		
15	47	151.36	3.94	0.58	3.31	$p < 0.01$	47.48	4.77	0.70	2.31	$p < 0.05$
16	46	151.17	4.27	0.63	0.21	ns	47.30	5.27	0.78	0.17	ns
17	46	151.92	4.62	0.68	0.83	ns	48.11	3.93	0.58	0.83	ns
18	50	152.41	4.21	0.60	0.54	ns	48.50	4.42	0.63	0.44	ns
19	50	153.58	4.20	0.60	1.38	ns	50.08	5.65	0.80	1.55	ns

N= total number of subjects, SD=standard deviation, SE= standard error

Table 3: Age-wise prevalence of overweight and obesity (defined by Asian cut-off point)

Age	Boys			Girls		
	N	Overweight	Obese	N	Overweight	Obese
14	40	3 (7.5%)	1 (2.5%)	45	4 (8.89%)	–
15	42	2 (4.76%)	1 (2.38%)	47	3 (6.38%)	–
16	41	2 (4.88%)	–	46	4 (8.69%)	–
17	42	2 (4.76%)	–	46	2 (4.35%)	–
18	45	2 (4.44%)	–	50	3 (6.00%)	–
19	46	3 (6.53%)	1 (2.17%)	50	3 (6.00%)	1 (2.00%)

N= total number of subjects

Table 4: Age-wise prevalence of overweight and obesity (defined by WHO)

Age	Boys			Girls		
	N	Overweight	Obese	N	Overweight	Obese
14	40	2 (5.00%)	–	45	1 (2.22%)	–
15	42	1 (2.38%)	–	47	2 (4.25%)	–
16	41	1 (2.44%)	–	46	2 (4.35%)	–
17	42	1 (2.38%)	–	46	1 (2.17%)	–
18	45	1 (2.22%)	–	50	2 (4.00%)	–
19	46	2 (4.35%)	–	50	3 (6.00%)	–

N= total number of subjects

Table 5: Distribution of overweight and obesity among adolescent (14-19 years)

Sex	Asian cut-off value				WHO International value	
	N	Overweight	Obese	χ^2	Overweight	Obese
Boys	256	14 (5.46%)	3 (1.17%)	1.52	8 (3.12%)	–
Girls	284	19 (6.69%)	1 (0.36%)		11 (3.87%)	–
Total	540	33 (12.15%)	4 (1.53%)		19 (6.99%)	–

N= total number of subjects, $\chi^2 = 1.52$, df=1, p>0.05**Table 6: Prevalence of overweight and obesity in some populations of India (defined by IOTF)**

Study groups	Age (years)	Overweight	Obese	References
Bangalore girls	9-18	15.14	2.62	Sood et al. 2007
Delhi boys	10-16	23.10	8.30	Kapil et al. 2002
Delhi girls	10-16	27.70	5.50	
Amritsar boys	6-11	1.24	5.92	
Amritsar girls	6-11	14.31	6.27	Sidhu et al. 2006
Pune boys	10-15	19.90	5.70	Khadilkar and Khadilkar 2004
Delhi boys	5-18	16.75	5.59	Marwaha et al. 2006
Delhi girls	5-18	19.01	5.73	Subramanyam et al. 2003
Chennai girls	10-15	9.63	6.23	Present Study
Manipur boys	14-19	5.45 (BMI $\leq$ 23)	1.17 (BMI $\geq$ 27.5) 0.36 (BMI $\geq$ 27.5)	
Manipur girls	14-19	6.69 (BMI $\geq$ 23)		

IOTF=International Obesity Task Force

DISCUSSION

The present study shows that height and body weight has increased along with age in both boys and girls. The age wise comparison also shows that, on the whole, boys are taller and heavier than girls. Overall socio-economic dev-

lopment in the last few decades and improvements in nutrition could be possible reasons for the increase in both height and body weight observed in the children.

With rapid socio-economic development, coupled by a changing lifestyle, which is increasingly sedentary, populations of both developed

and developing countries are facing rapid increases in the prevalence of overweight and obesity among children and adolescent. These patterns of overweight and obesity differ by age, sex, socio-economic condition and rural-urban residence (Matijaasevich et al. 2009). In many developing countries, with increasing urbanization, mechanization of jobs, transportation and dependence on television for leisure, people are increasingly adopting less physically active sedentary lifestyles, while at the same time consuming more energy-dense, nutrient-poor diets (Drewnowski and Popkin 1997; Bell et al. 2002; WHO 2003; Popokin 2004). These rapidly changing diets and lifestyles are fueling the global obesity epidemic (WHO 2003).

Likewise, Imphal has undergone dramatic changes as the result of urbanization and socio-economic development. It has given rise to significant changes in the overall lifestyle among the Meitei population. This has come together with changes in food habits, especially in terms of increasing consumption of processed foods, fast food, meals prepared by roadside vendors. On the whole, the increasing number of processed and fast food restaurants seem to have gradually altered Manipur's food environment.

The present study reveals the prevalence of overweight and obesity according to WHO International value and Asian cut-off points (WHO 2000). The prevalence of overweight is higher among Meitei girls, while obesity is found higher among boys. The higher prevalence of overweight among girls in the present study is found consistent with the gender difference in other Indian populations and other parts of the world (Kapil et al. 2002; Steller et al. 2002; Kruger et al. 2006; Marwaha et al. 2006; Ben-Bassey et al. 2007). The higher prevalence of overweight among adolescent girls may be related to the early onset of puberty and adolescent growth spurt which occur earlier among girls (Hirsch 1995; Chhatwal et al. 2004). Studies also reported that the number of adipose tissue cells increase during the puberty and adolescent growth spurt (Hirsch 1995). On the contrary, several studies from India and different parts of the world have reported a higher prevalence of overweight and obesity among boys (Tremblay et al. 2002; Sharma et al. 2007). All these studies clearly indicate that the sex of the child has an influence on

the prevalence of overweight and obesity, a finding this study also confirms to.

In conclusion, prevalence of overweight and obesity in the present study is very low in comparison to other studies conducted in different parts of India, which in itself show a wide variation (see Table 6). Possible reasons could be the different age groups included in these studies and difference in criteria being used to defined overweight and obesity. More importantly, a prominent explanatory reason might be the profound difference in socio-economic conditions and lifestyles. The widely differing prevalence of overweight and obesity could be due to the definitions used, age group and sex taken for the study, selection of the sample, area selected and the methodology used for the survey (Kotian et al. 2010). However, the present study does clearly shows an increase in the prevalence of overweight in both boys (3.12%) and girls (3.87%) in Manipur, as compared to the reported data from National Family Health Survey-3 (NFHS-3), where the prevalence of overweight among 15-19 years boys and girls were 1.8 percent and 3.1 percent respectively (IIPS 2007). Therefore, there is a need to create an awareness among the population about the consequences of overweight since Manipur state is witnessing an increased level of urbanization, changes in dietary intake, food consumption and sedentary lifestyles that could lead to an increase in the prevalence of overweight and obesity and its associated health problems in the near future.

ACKNOWLEDGEMENTS

The authors are very thankful to all the subjects for their cooperation and patience during the time of fieldwork. M. S. Singh is grateful to University Grant Commission for providing financial assistant through UGC-JRF Fellowship.

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